

Nonparametric bootstrap of high-dimensional  
sample covariance matrices  
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May 17, 2023

We introduce a new „ $(m, mp/n)$  out of  $(n, p)$ “-sampling with replacement bootstrap for eigenvalue statistics of high-dimensional sample covariance matrices based on  $n$  independent  $p$ -dimensional random vectors. In the high-dimensional scenario  $p/n \rightarrow c \in [0, \infty)$ , this fully nonparametric bootstrap is shown to consistently reproduce the underlying spectral measure if  $m/n \rightarrow 0$ . If  $m^2/n \rightarrow 0$ , it approximates correctly the distribution of linear spectral statistics. The crucial component is a suitably defined representative subpopulation condition which is shown to be verified in a large variety of situations. The proofs incorporate several delicate technical results which may be of independent interest.